


17.1

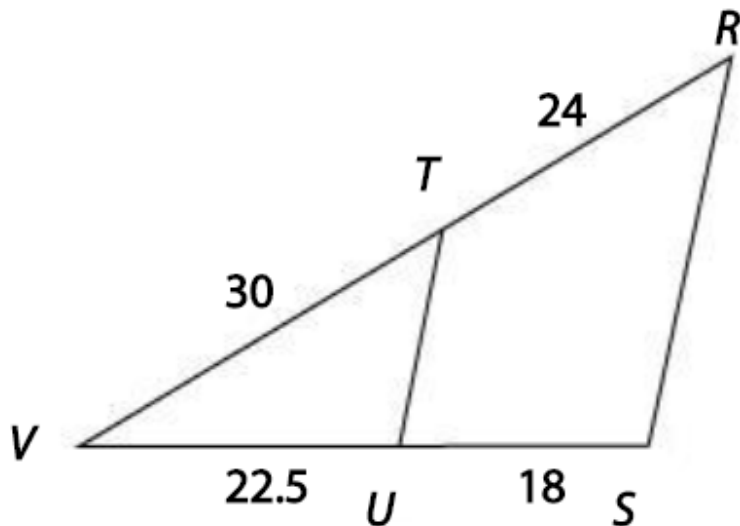
Personal Math Trainer 

17.1 Triangle Proportionality Theorem - Teacher



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- 1 Verify that the segments RS and TU are parallel, if the length of segments $TR = 24$, $VT = 30$, $US = 18$ and $VU = 22.5$.



*You can use the Converse of the Triangle Proportionality Theorem to verify that a line is parallel to a side of a triangle.

$$\frac{VT}{TR} = \frac{VU}{US}$$

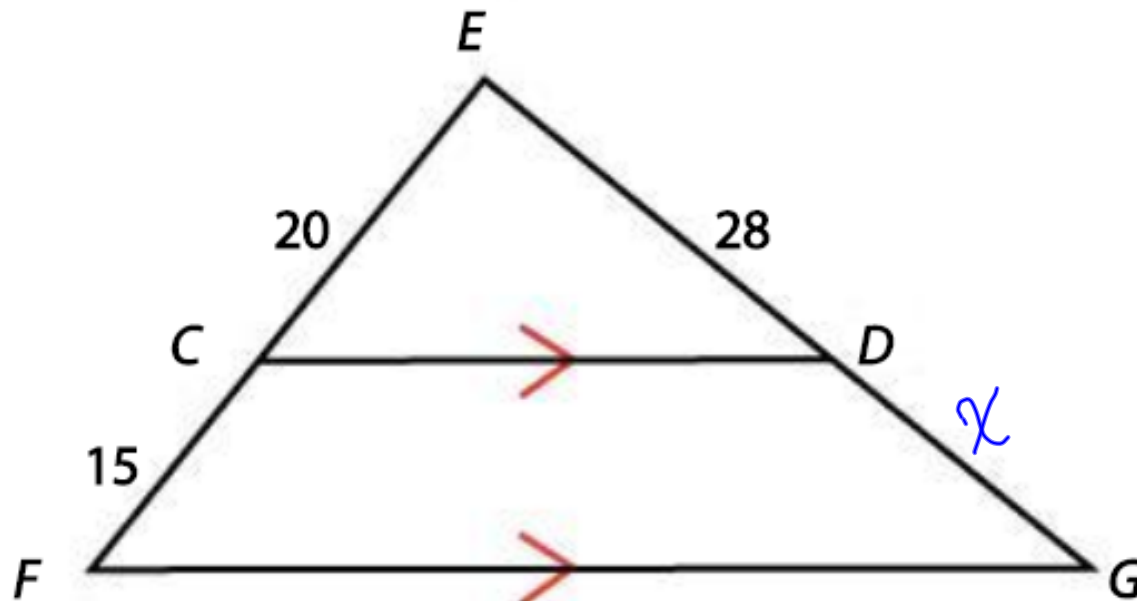
$$\frac{22.5}{18} = \frac{30}{24}$$

$$\frac{5}{4} = \frac{5}{4}$$

Since, $\frac{VT}{TR} = \frac{VU}{US}$, $\overline{RS} \parallel \overline{TU}$, by the Converse of the Triangle Proportionality Theorem.

2

Find the length of segment DG if $EC = 20$, $CF = 15$ and $ED = 28$.



It is given that $\overline{CD} \parallel \overline{FG}$.

$$\frac{EC}{CF} = \frac{ED}{DG}$$

$$\frac{20}{15} = \frac{28}{x}$$

$$\cancel{20}x = \frac{15(28)}{\cancel{20}}$$

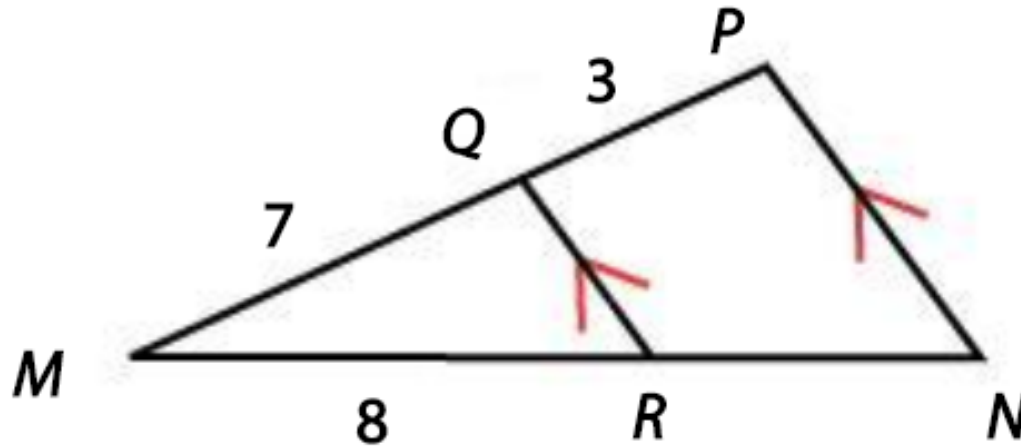
$$x = \frac{15(28)}{\cancel{20} \cdot 4}$$

$$x = 21$$

The length of segment DG is .

3

Find the length of segment RN if $MQ = 7$, $QP = 3$ and $MR = 8$.
Enter your answer as a fraction or mixed number.



It is given that $\overline{QR} \parallel \overline{PN}$.

$$\frac{MQ}{QP} = \frac{MR}{RN}$$

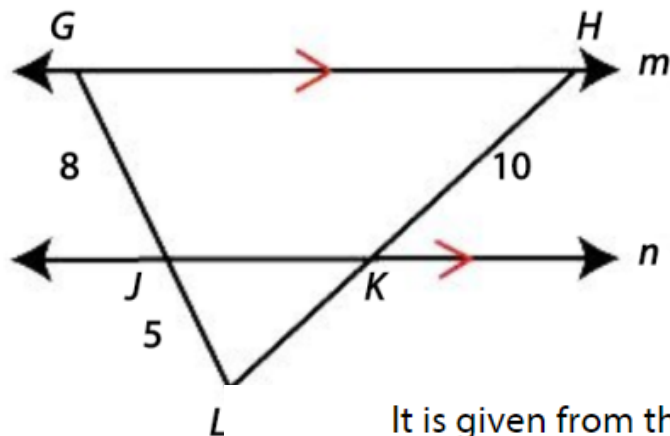
$$\frac{7}{3} = \frac{8}{X}$$

$$7X = 3(8)$$

$$X = \frac{24}{7}$$

$$\text{So, } RN = 3\frac{3}{7}$$

- 4 Find the length of segment KL , if the length of segment $JL = 5$, segment $GJ = 8$ and segment $HK = 10$. Enter your answer as a fraction or mixed number.



It is given from the graph that $\overline{GH} \parallel \overline{JK}$.

So, $\frac{JL}{GJ} = \frac{KL}{HK}$ by the Triangle Proportionality Theorem.

Substitute 5 for JL , 8 for GJ and 10 for HK .

$$\frac{5}{8} = \frac{KL}{10}$$

Multiply both sides by 10.

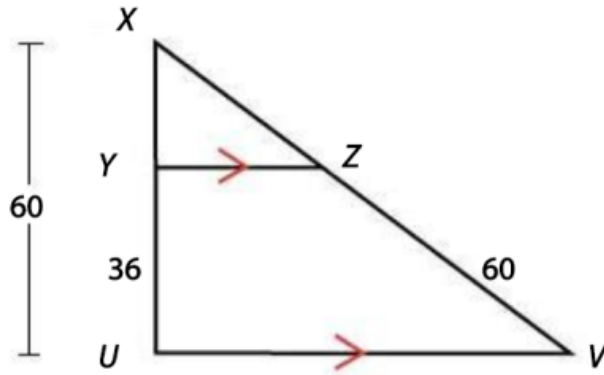
$$10 \left(\frac{5}{8} \right) = \cancel{10} \left(\frac{KL}{\cancel{10}} \right)$$

Simplify.

$$KL = \frac{50}{8} = 6\frac{2}{8} = \left(6\frac{1}{4} \right)$$

5

Find the length of segment XZ , if the length of segment $YU = 36$, segment $ZV = 60$ and segment $XU = 60$.



It is given from the triangle that $\overline{UV} \parallel \overline{YZ}$.

So, $\frac{XY}{YU} = \frac{XZ}{ZV}$ by the Triangle Proportionality Theorem.

From the triangle, the length of segment

$$XY = 60 - 36 = 24$$

Substitute 24 for XY , 36 for YU and 60 for ZV .

$$\frac{24}{36} = \frac{XZ}{60}$$

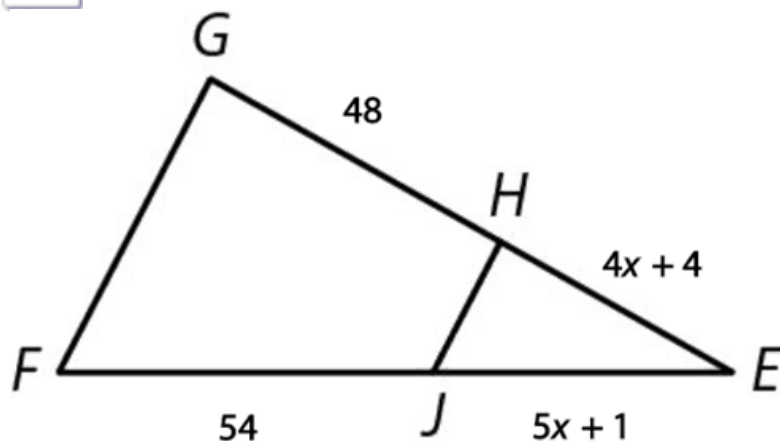
Multiply both sides by 60.

$$60 \left(\frac{24}{36} \right) = \cancel{60} \left(\frac{XZ}{\cancel{60}} \right)$$

Simplify.

$$XZ = \frac{1,440}{36} = 40$$

6 For what value of x is $\overline{GF} \parallel \overline{HJ}$?



$$\overline{GF} \parallel \overline{HJ}, \text{ if } \frac{EH}{HG} = \frac{EJ}{JF}$$

$$\text{That is if, } \frac{4x + 4}{48} = \frac{5x + 1}{54}$$

Cross products property

$$54(4x + 4) = 48(5x + 1)$$

$$216x + 216 = 240x + 48$$

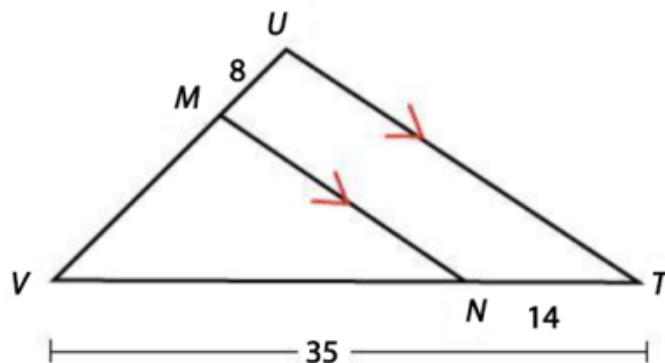
$$-240x - 216 \quad -240x - 216$$

$$-24x = -168$$

$$x = 7$$

Then, for $x = 7$, $\overline{GF} \parallel \overline{HJ}$.

- 7 Find the length of segment VM , if the length of segment $NT = 14$, segment $MU = 8$ and segment $VT = 35$.



It is given from the triangle that $\overline{TU} \parallel \overline{NM}$.

So, $\frac{VN}{NT} = \frac{VM}{MU}$ by the Triangle Proportionality Theorem.

$$\begin{aligned} \text{From the triangle, the length of } VN &= VT - NT. \\ &= 35 - 14 = 21 \end{aligned}$$

Substitute 21 for VN , 14 for NT and 8 for MU .

$$\frac{21}{14} = \frac{VM}{8}$$

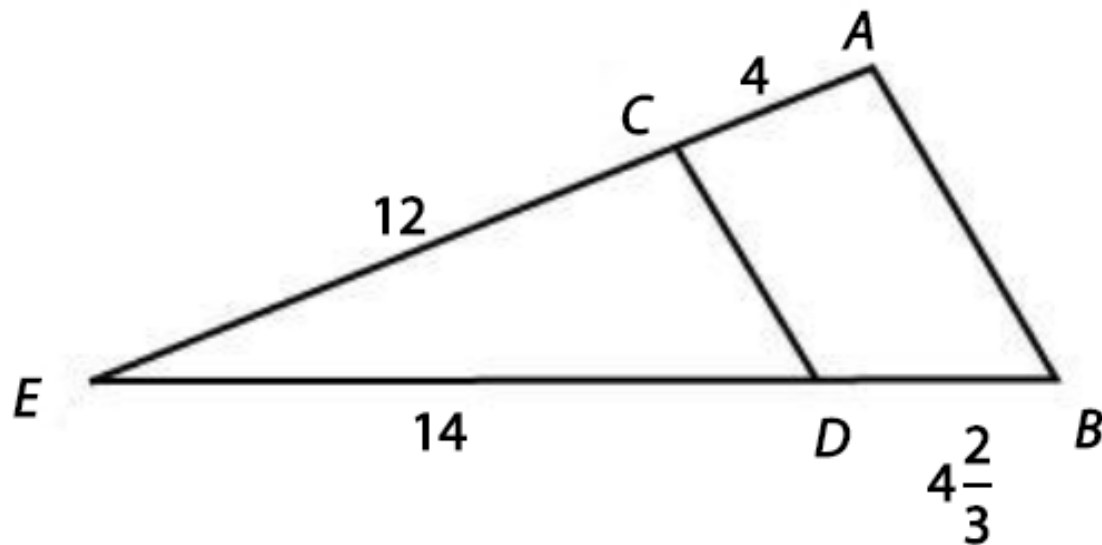
Multiply both sides by 8.

$$8\left(\frac{21}{14}\right) = \cancel{8}\left(\frac{VM}{\cancel{8}}\right)$$

$$VM = 8\left(\frac{21}{14}\right) = 12$$

8

Verify that \overline{AB} and \overline{CD} are parallel. $EC = 12$, $CA = 4$, $ED = 14$ and $DB = 4\frac{2}{3}$.



$$\frac{ED}{DB} = \boxed{3} \text{ and } \frac{EC}{CA} = \boxed{3}$$

$$\frac{ED}{DB} = \frac{14}{4\frac{2}{3}} = \frac{14}{\frac{14}{3}} = 14 \cdot \frac{3}{14} = 3$$

Flip

$$\frac{ED}{DB} = \boxed{=} \frac{EC}{CA}$$

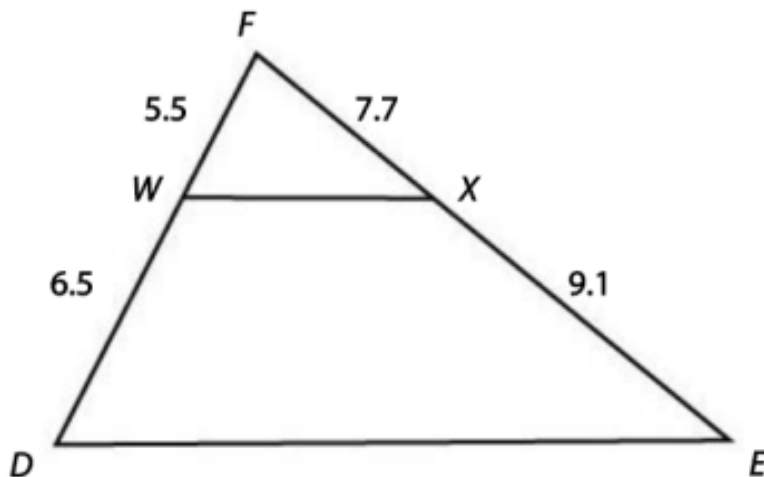
$$\frac{EC}{CA} = \frac{12}{4} = 3$$

So, \overline{AB} and \overline{CD} are .

9

Verify that \overline{DE} and \overline{WX} are parallel. The length of segment $FW = 5.5$, $WD = 6.5$, $FX = 7.7$, and $XE = 9.1$.

Enter the ratios as decimals, rounded to the nearest hundredth.



$$\frac{FW}{WD} = \frac{5.5}{6.5} = 0.85$$

$$\frac{FX}{XE} = \frac{7.7}{9.1} = 0.85$$

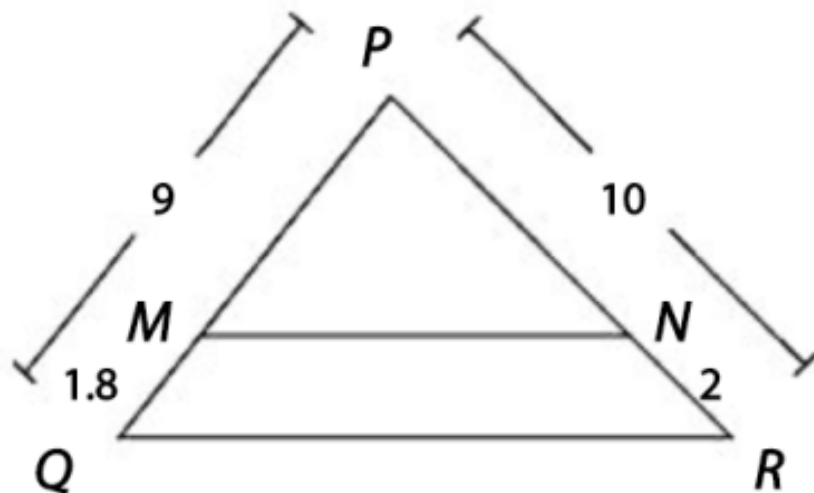
$$\frac{FW}{WD} = \boxed{0.85} \text{ and } \frac{FX}{XE} = \boxed{0.85}$$

$$\frac{FW}{WD} \boxed{=} \nabla \frac{FX}{XE}$$

So, \overline{DE} and \overline{WX} are .

10

Verify that \overline{QR} and \overline{MN} are parallel. The length of segment $MQ = 1.8$, $NR = 2$, $PQ = 9$ and $PR = 10$.



Find the length of segment PM .

$$PM = 9 - 1.8 = 7.2$$

$$\frac{PM}{MQ} = \frac{7.2}{1.8} = 4$$

Find the length of segment PN .

$$PN = 10 - 2 = 8$$

$$\frac{PN}{NR} = \frac{8}{2} = 4$$

$$\frac{PM}{MQ} = \boxed{4} \text{ and } \frac{PN}{NR} = \boxed{4}$$

$$\frac{PM}{MQ} = \boxed{=} \frac{PN}{NR}$$

So, \overline{QR} and \overline{MN} are .